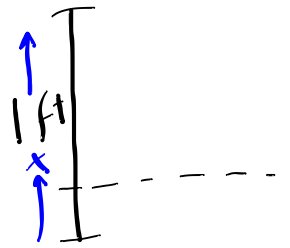
7.2|36

what are the pts of intersection?
$x^2 = \sqrt{x} \Rightarrow x^4 = x \Rightarrow x^4 - x = 0 \Rightarrow x(x^3 - 1) = 0$

what is the cross sectional shape?



$\Rightarrow$ annulus

what is the area of a cross section?

$\pi R_o^2 - \pi R_I^2$

what are the radii?

$R_o = \sqrt{x}$; $R_I = x^2$

the area of my cross-sect $= \pi(\sqrt{x})^2 - \pi(x^2)^2$

$$\text{Volume} = \int_0^1 \pi(\sqrt{x})^2 - \pi(x^2)^2 \, dx =$$

$$\pi \int_0^1 x - x^4 \, dx = \pi\left(\frac{x^2}{2} - \frac{x^5}{5}\right)\Big|_0^1$$

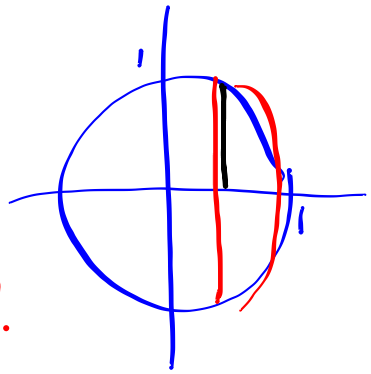
$$= \pi\left(\frac{1}{2} - \frac{1}{5}\right) - 0 = \frac{3\pi}{10}$$

7.2/39 base of solid $\Rightarrow$ $x^2+y^2=1$

a) shape?

semicircle

area of shape?



$y^2=1-x^2$

$y=\sqrt{1-x^2}$

$A=\frac{1}{2}\pi r^2$

what is r?

$r=y=\sqrt{1-x^2}$

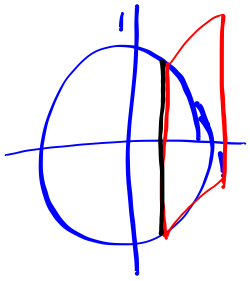
$A=\frac{1}{2}\pi\left(\sqrt{1-x^2}\right)^2$

$$\text{Volume}=\int_{-1}^{1}\frac{\pi}{2}(1-x^2)\,dx=\frac{\pi}{2}\int_{-1}^{1}1-x^2\,dx$$

$$=\frac{\pi}{2}\left(x-\frac{x^3}{3}\right)\Big|_{-1}^{1}=\frac{\pi}{2}\left[\left(1-\frac{1}{3}\right)-\left(-1-\frac{-1}{3}\right)\right]$$

$$=\frac{\pi}{2}\left(2-\frac{2}{3}\right)=\frac{\pi}{2}\left(\frac{4}{3}\right)=\frac{2\pi}{3}$$

7.2/39b



shape?

$\Rightarrow$ square

area of shape?

$\Rightarrow A = s^2$

what is s?

$s = 2y = 2\left(\sqrt{1-x^2}\right)$

Area of cross section $= s^2 = \left(2\sqrt{1-x^2}\right)^2$

$= 4(1-x^2)$

$\text{Volume} = \int_{-1}^{1} 4(1-x^2)\,dx = 4\left(x - \frac{x^3}{3}\right)\Big|_{-1}^{1}$

$= 4\left[\left(1-\frac{1}{3}\right) - \left(-1-\frac{-1}{3}\right)\right]$

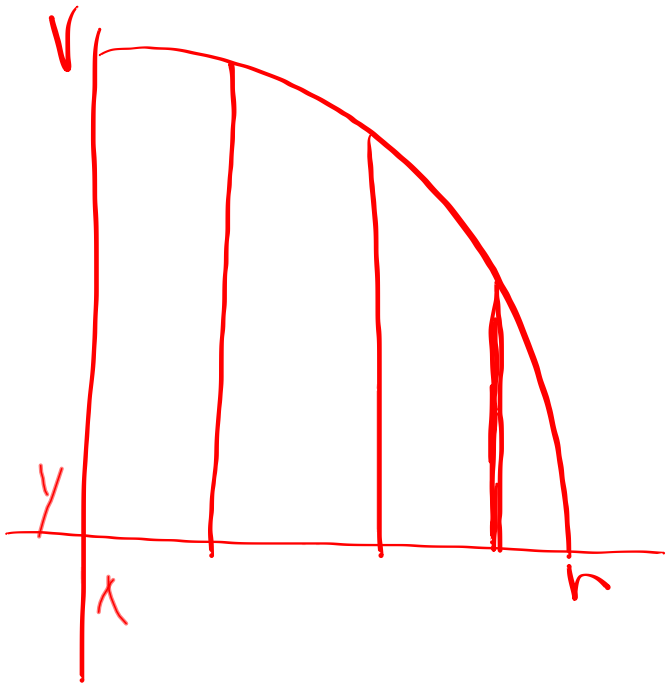
$= 4\left(\frac{4}{3}\right) = \frac{16}{3}$

$V_\odot = \frac{4}{3}\pi r^3$

$SA_\odot = 4\pi r^2$

find V of a cube when SA = V

find 2 or 3 ways to set up integral to get Vol of cube



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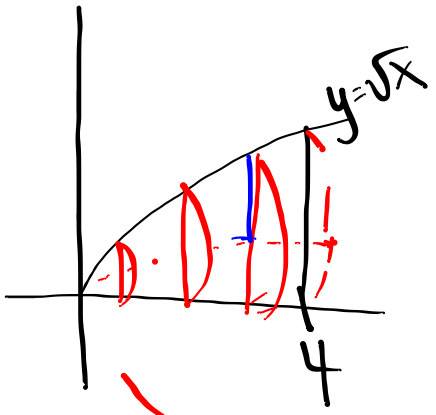
7.2 / 38 base: $y=\sqrt{x}$, $y=0$, $x=4$

cross-section: semicircle



area of a $\triangle$: $\frac{\pi r^2}{2}$

what is the r?

$r=\frac{1}{2}y=\frac{1}{2}\sqrt{x}$

what the limits are: $x\in[0,4]$

y=d

$$\text{Volume}=\int_0^4 \frac{\pi\left(\frac{1}{2}\sqrt{x}\right)^2}{2}\,dx$$

$$=\frac{\pi}{8}\int_0^4 x\,dx=\frac{\pi}{8}\left.\frac{x^2}{2}\right|_0^4=\pi$$

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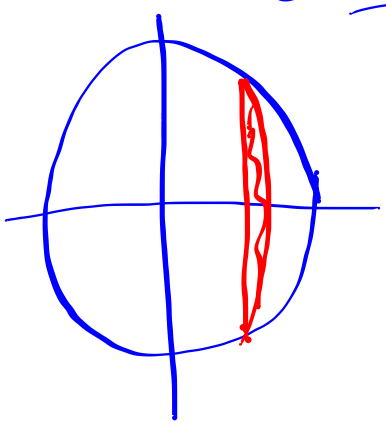
39 (a)

base: $x^2+y^2=1 \rightarrow y^2=1-x^2$

$y=\sqrt{1-x^2}$

cross-section: semicircle



area w/ $\cap = \frac{1}{2}\pi r^2$.

what is r?

$r=y=\sqrt{1-x^2}$

limits: $[-1,1]$

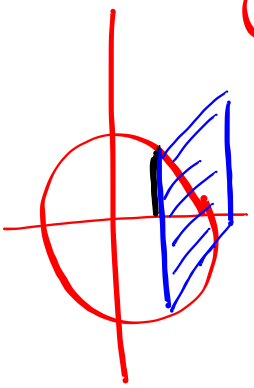
Volume: $\int_{-1}^{1} \frac{\pi}{2}\left(\sqrt{1-x^2}\right)^2 dx = \frac{\pi}{2}\int_{-1}^{1}(1-x^2)dx$

$= \frac{\pi}{2}\left(x-\frac{x^3}{3}\right)\Big|_{-1}^{1} = \frac{\pi}{2}\left(1-\frac{1}{3}-\left(-1-\frac{-1}{3}\right)\right)$

$= \frac{\pi}{2}\left(2-\frac{2}{3}\right) = \frac{\pi}{2}\left(\frac{4}{3}\right) = \frac{2\pi}{3}$

b: base: $x^2+y^2=1$

Cross-section: squares



area of $\square = s^2$

what is s?

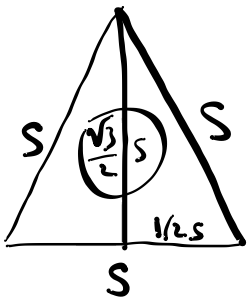
$s = 2y = 2\sqrt{1-x^2}$

$$\text{Volume} = \int_{-1}^{1} (2y)^2\,dx = \int_{-1}^{1} 4\left(\sqrt{1-x^2}\right)^2 dx$$

$$= 4\int_{-1}^{1} 1-x^2\,dx = 4\left(x-\frac{x^3}{3}\right)\Big|_{-1}^{1} = 4\left(\frac{4}{3}\right) = \frac{16}{3}$$

39c) base: $x^2+y^2=1$

cross-section: equilateral triangle



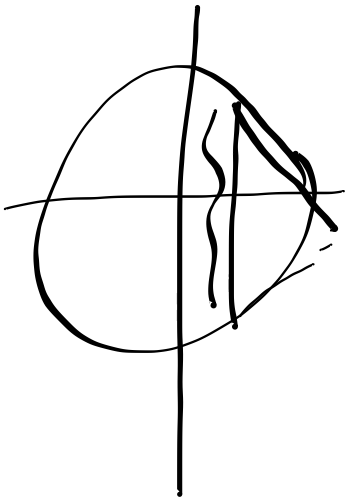
$A=\frac{1}{2}bh$

$=\frac{1}{2}(s)\left(\frac{\sqrt{3}}{2}s\right)$

area $=\frac{\sqrt{3}}{4}s^2$

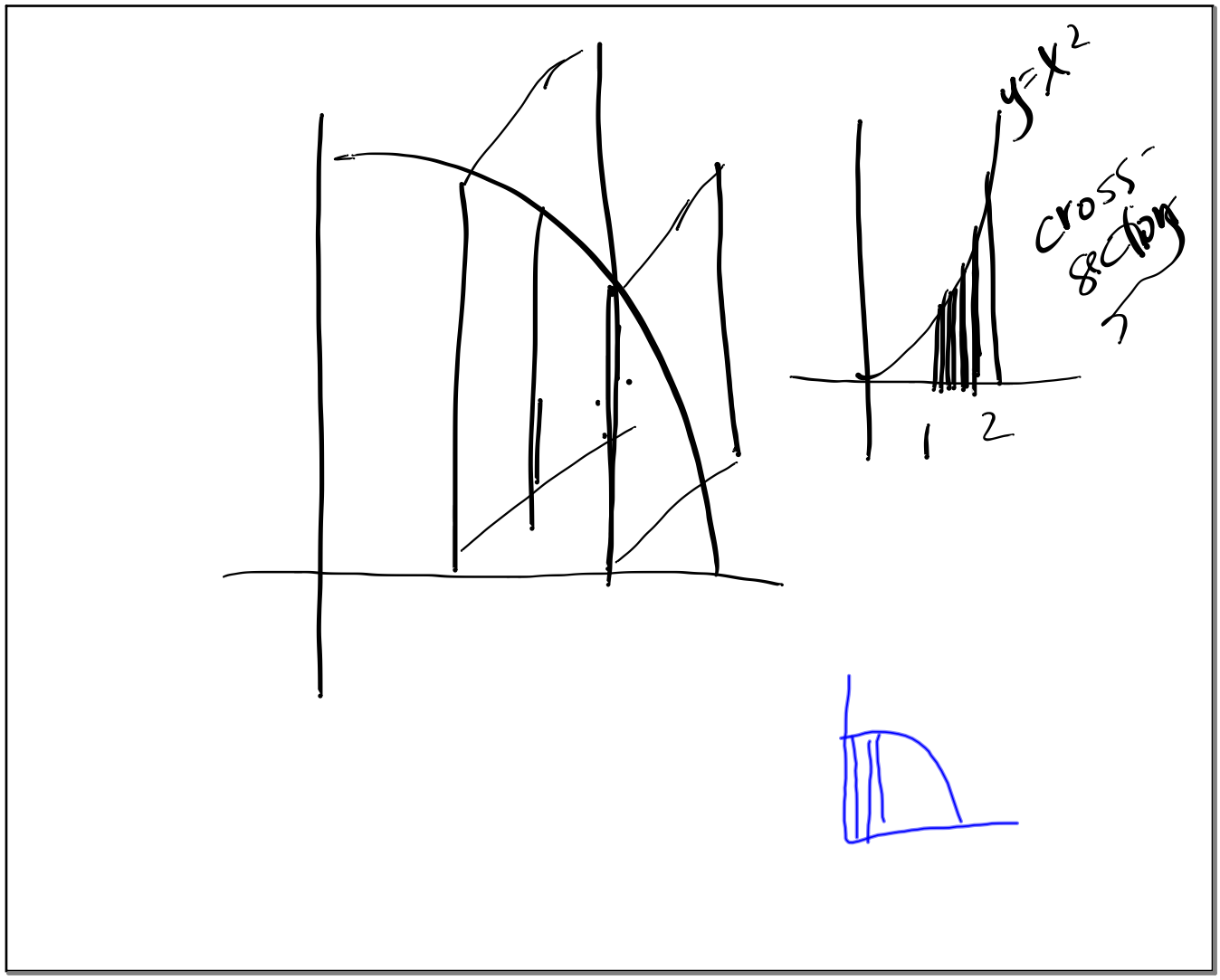
what is s?

$s=2y=2\sqrt{1-x^2}$



$V=\int_{-1}^{1}\frac{\sqrt{3}}{4}\left(2\sqrt{1-x^2}\right)^2dx$

$=\sqrt{3}\left(x-\frac{x^3}{3}\right)\Big|_{-1}^{1}=\sqrt{3}\left(\frac{4}{3}\right)=\frac{4\sqrt{3}}{3}$



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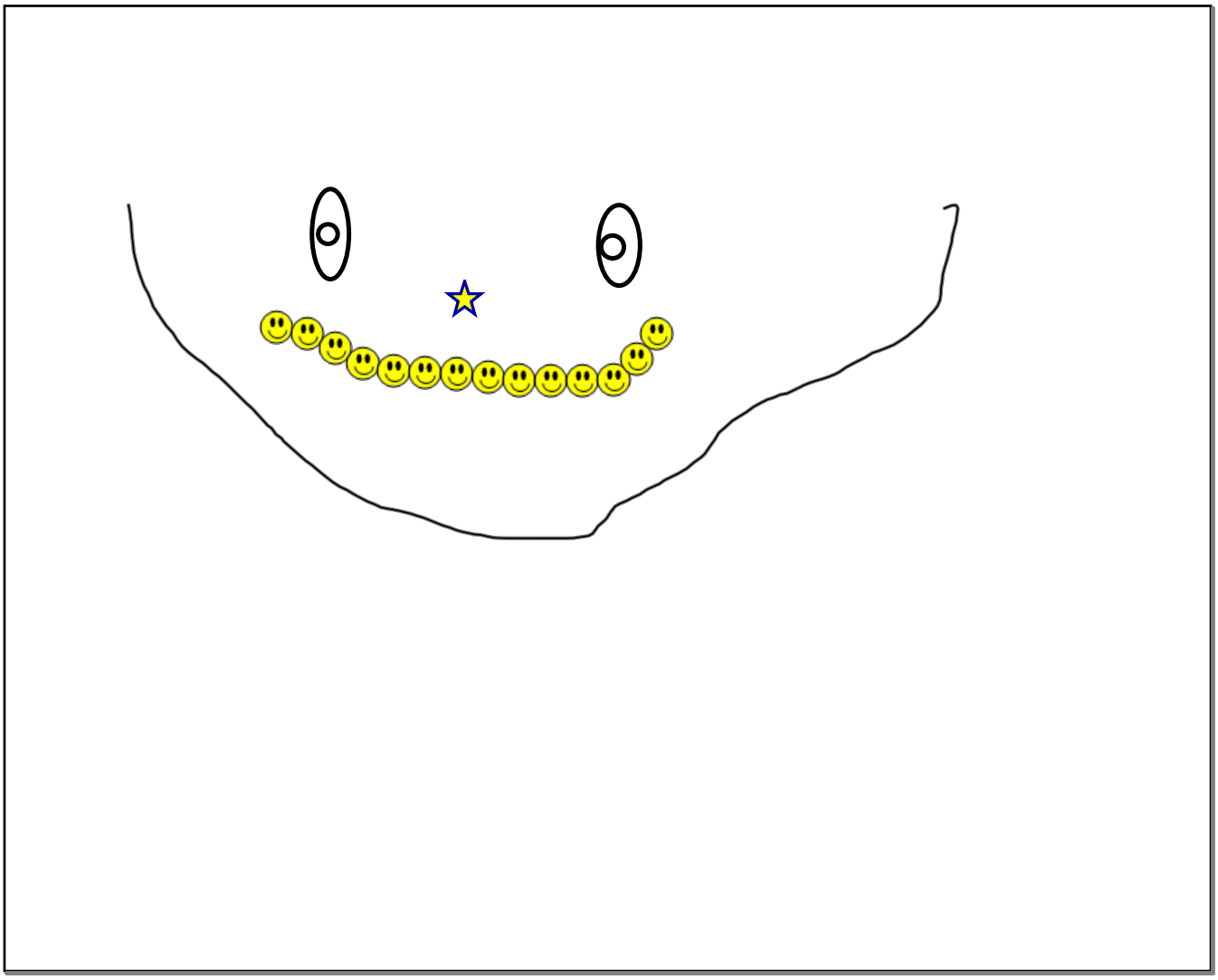

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